

"To Make the Best Better"

4-H Youth Development



Discipline: All
Age Level: All
Time: 60-90 minutes

Simple Structures – Tower

Next Generation Science Standard : K-2-ETSI-2 Engineering Design—
Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

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Objective/Success Indicators: Students will understand how physiology of the human body is used to “engineer” a stable platform or base for better shooting sports performance.

Assessment Question: Does shooting position affect shooting performance?

Supplies:

Gallon sized Ziploc bag for each group of 2-4 youth, with:
6-10 Paper clips
25-40 drinking straws (or stir sticks)
~2 feet of masking tape (stick to outside of bag)
item to suspend or support (eg. Steel ball, stack of pennies, lead fishing weight)

3-4 rubber bands
~4 feet of string
4-8 index cards

Feel free to replace items with whatever you have on hand; make the “kits” ahead of time.

Lesson Outline:

1. Explain the terms force, mass, gravity, structural integrity and stability.
2. Break the group into small teams of 2-4 students equipped with one of the ziploc bags. Challenge the teams to build a structure that meets certain criteria (e.g. at least 12” tall , free standing and support at least 25 pennies.)
3. Give the teams time (approximately 30 minutes) to evaluate the items in their Ziploc bag, design and test a structure.
4. As a large group, evaluate the results. Discuss common successful design traits, and novel approaches. Reinforce the terms and how they are illustrated in the structures. Talk about the importance of a solid base from which to build a structure, or demonstrate how stability might change with a different base.
5. Brainstorm the different forces that are exerted on a real life structure, and then in small groups decide which of those forces are exerted on the human body in shooting sports, and what can be done to create a more stable base from which to build each shooting position.
6. Report back in the large group, and ask the youth to decide which stability measures they will incorporate into their shooting during practice.



Background Information:

Body posture and stance is important in all aspects of shooting sports. How we support the firearm or bow, the stable platform that we shoot from, affect our stability and thus our shot. This exercise will challenge students to think about structural integrity and how to create stable platforms in shooting sports, from the context of structural engineering.

Terms

Force - strength or energy as an attribute of physical action or movement.

Mass - the quantity of matter in a body regardless of its volume or of any forces acting on it

Gravity - the force of attraction between all masses in the universe

Stability - the strength to stand or endure

Structural Integrity - the ability of an item to hold together under a load, including its own weight, resisting breakage or bending

Center of Gravity - the point at which the entire weight of a body may be thought of as centered so that if supported at this point the body would balance perfectly

Additional Resources:

Try the other Simple Structures activities for Cantilevers and Bridges